

Listeria Meningitis in a Pregnant Woman with Eclampsia: A Case Report

Bakiye Okumuş, Mehmet A. Osmanağaoğlu and Hasan Bozkaya

Department of Obstetrics and Gynecology,
Medicine School of Karadeniz Technical University, Trabzon, 61080 Turkey

INTRODUCTION

Preeclampsia, a syndrome unique to human pregnancy, featuring hypertension and proteinuria, usually occurs after 20 weeks' gestation [1]. Eclampsia is defined as seizures activity or coma unrelated to other cerebral conditions before, during pregnancy or post partum in patients with pre-eclampsia. Eclampsia creates a functional derangement of multiple organ systems. Neurologic deficit rate of eclampsia is 7% and mortality is 1%. *Listeria monocytogenes* is an intracellular organism that especially affects patients with decreased cell mediated immunity such as the elderly, transplant recipients, cancer patients, dialysis patients, patients with diabetes mellitus, suffering alcoholism, receiving long term corticosteroid treatment, liver failure, splenectomy and those with HIV infection [2, 3]. *Listeria* infection in pregnant women, at any stage of pregnancy, can lead to miscarriage, stillbirth or premature birth, or very sick newborn babies. Perinatal listeriosis mainly affects women without additional predisposing factors. Alimentary transmission is considered the most common route of acquisition of *Listeria* infection. Most cases of human listeriosis, including those during pregnancy, have been sporadic, with occasional common-source outbreaks. Such outbreaks have been associated with the consumption of a wide variety of foods, ranging from dairy products, to ready-to-eat deli meats, melons and hummus [4-6]. In listeriosis during pregnancy Central Nervous System (CNS) infection is rarely seen in the absence of other preexisting risk factors [2]. Our aim was to evaluate a pregnant woman with eclampsia in which *Listeria* meningitis initially was not suspected, with regard to the possible risk factors and obstetric management and complications influencing clinical outcome.

Case report: A 23-year-old multigravid woman was referred to our university hospital at 36 weeks' gestation because of generalized tonic-clonic convulsions without

evidence of head trauma. The patient had had a 4-days history of nausea and vomiting and consuming of foods including soft cheeses, unpasteurized (raw) milk and deli-counter meats, especially chicken and vegetables. There was also a history of preeclampsia in the precedent pregnancy. At the time of admission to our hospital, she was in a comatose condition. Her temperature was 38.5°C, blood pressure (BP) 200/120 mmHg. The remainder of the examination was normal. No abnormalities were seen on ultrasound examination and fetal growth corresponded with gestational age.

The initial laboratory tests included haemoglobin 10.8 g dL⁻¹, hematocrit 38.7%, white cell count 29800/μL, LDH: 683 U/L, albumin 3.6 g/L, CRP: 21 mg dL⁻¹ and +2 proteinuria. Platelet count, bilirubin, alanine and aspartate transaminase and alkaline phosphatase were within normal limits. Tests for serum antibodies to hepatitis C virus, hepatitis B surface antigen, venereal disease research laboratory, anti-HIV tests were also negative. The blood and urine culture were negative. She received nifedipine sublingual following alpha methyle dopa 3x1. Although an induction of the labor had been started with magnesium sulphate infusion, because of the labor arrest and fetal distress, a cesarean operation was done under general anesthesia and delivery of a 3300 g female fetus was achieved. The Apgar scores were 1 and 5 at 7 and 8 min, respectively. The procedure was uncomplicated. In the earlier of postoperative period she became suddenly confused and had a stiff neck. The magnesium level ranged between 4.6-6.2 mg dL⁻¹, 6x1/day. Following neurological consultation, A CT scan of the head showed cerebral edema. Therefore mannitol was initiated. Two days after, she had a skin lesion comprised of vesicular lesions involving the nose and mouth. Lumbar puncture was realised with a suspicion of herpetic encephalitis. Cerebrospinal Fluid (CSF) was clear with a pressure of 15 cm/H₂O. CSF protein level 142 mg dL⁻¹, glucose 32 mg dL⁻¹ (CSF glucose/blood glucose: 0.4), the number of white blood cells: 200/mm³, erythrocytes: 120/mm³ and

the percentage of polymorphonuclear leucocytes 90%. No bacteria was detected on gram stain. Since neither CSF or neither blood parameter has been able to discriminate between bacterial and viral meningitis, seftriaxon 2x2 g and acyclovir 3x100 mg were initiated. Following neurological reconsultation, it has been detected a positive babinsky reflex and thereafter intensive cerebral meningeal contrast enhancement was reported in magnetic resonance imaging. An electroencephalography showed irregular diffuse slowing activity. Serologic evaluation of blood for HSV 1 and 2 Ig M, polymerase chain reaction of CSF for the detection of HSV DNA and viral or bacterial culture of CSF were negative. Although blood culture failed to grow listeria, she was transferred to infection clinic with a suspicious of listeria meningitis and ampicillin 4x1 g was initiated. On the 3rd day, she became afebrile and was in good condition. However, it has been demonstrated a rhinorrhea on the 7th day, the cranial CT scan especially evaluated paranasale, temporal lobes was with a normal CT findings. With a conservative treatment including of strict bed rest, head elevation and stool softeners, the rhinorrhea was discontinued two day after. The remaining postoperative course was uneventful and she was discharged on 10th day under administration of ampicillin 4x1g until 15th day. At the control, the patient and her baby were in good condition without complication.

Listeria monocytogenes is a type of non-sporing gram-positive bacteria that is found in water and soil. Vegetables can become contaminated from the soil and animals can also be carriers. The incubation period for listeriosis can be long (between 3-70 days) [7]. The physical signs of listeriosis are not always obvious. Infection can occur at any time during pregnancy, but it is most common during the third trimester. The fetus can be affected in utero through maternal bacteraemia or by ascending invasion from lower genital tract. Some pregnant women have no symptoms. Others have mild flu like symptoms, headaches, muscle aches, fever, nausea and vomiting. If infection spreads to the central nervous system, symptoms such as headache, stiff neck, confusion, loss of balance or convulsions can occur. CNS disease is the second most common presentation of *L. monocytogenes* infection in the immunocompromised population. Meningitis secondary to listeria presents similarly to other forms of meningitis and is, likewise, often devastating. The clinician should be highly suspicious of this organism if the patient is immunosuppressed [8].

Since bacterial meningitis is a neurologic emergency, a blood culture and lumbar puncture should be performed

immediately to confirm the diagnosis. To avoid brain herniation, a CT scan might be obtained before undergoing the lumbar puncture. *L. monocytogenes* is distinguished from the other meningitis pathogens in that it has a special predilection for brain parenchyma [2]. Patients with this type of meningitis are often found to have coexisting cerebritis and brain abscesses [8]. The organism also shows preference for the brainstem and causes rhomboencephalitis. This type of brain infection is different from the typical meningoencephalitis in that it usually presents in healthy individuals [9]. Rhomboencephalitis is usually exhibited by 3-5 days of non-specific fever, nausea, vomiting and headache [8]. Coma may be the initial symptom in up to 30% of patients and is seen most often in the older and more immunosuppressed population [10]. Close to 50% of patients also develop respiratory distress and failure. Nuchal rigidity is only present 50% of the time and CSF cultures may be sterile in 60% of specimens [2]. Analysis of the CSF may show a negative Gram stain, pleocytosis, increased protein and normal glucose concentration. The normal glucose concentration allows listeriosis to be differentiated from other types of bacterial meningitis. In 60–75% of cases, blood cultures are positive [9]. *Listeria* may also present with brain abscesses in about 10% of cases when the CNS is involved [8]. *Listeria* also uniquely forms abscesses in subcortical areas such as the medulla, pons and thalamus.

High-dose ampicillin is the initial treatment of choice for *Listeria* infection and the synergistic and bactericidal effects of adding gentamicin may be desirable in treatment of newborns and patients with underlying disease [11,12]. A two week course of ampicillin, 4-6 g/day, 4x1, is generally the treatment of choice [13]. Iron supplementation should be discontinued because iron appears to enhance the virulence of the organism [9, 14]. However, *Listeria monocytogenes* is uniformly resistant to cephalosporins and clindamycin, which are frequently used in the management of sepsis and meningitis [12]. When infection occurs during pregnancy, antibiotics given promptly to the pregnant woman can often prevent infection of the fetus or the newborn. After delivery, the placenta should be sent for microscopic evaluation.

Our patient had a prior history of preeclampsia and clinical features (such as, proteinuria hypertension, convulsion) that helped distinguish between eclampsia and other disorders caused convulsion (meningitis). Since the definitive treatment for eclampsia is delivery of the fetus, because of the labor arrest and fetal distress, a cesarean operation was performed. However the patient

Table 1: Comparison of cerebrospinal fluid findings by type of organism

	Bacterial meningitis	Viral meningitis
Pressure		
5-15 cm H ₂ O	Increased	Normal or mildly increased
Cell count		
Preterm: 0-25 term: 0-22 >6 Months: 0-5 mononuclear cells/mm ³	Typically thousands of PMNs, but may be less dramatic or even normal Lymphocytosis with normal CSF chemistries seen in 15-25%, especially when cell counts <1000 or if partially treated.	Usually <500 cells, nearly 100% mononuclear. Up to 48 hours, significant PMN pleocytosis may be indistinguishable from early bacterial meningitis.
Micro no organisms	Gram stain 80% effective. Pretreatment with antibiotics may affect stain uptake, causing gram-positive organisms to appear gram negative and decrease culture yield on average 20%.	No organism
Glucose	Decreased	Normal
euglycemia: >50% serum hyperglycemia: >30% serum wait 4 h after glucose load		
Protein	Usually >150, may be >1000	Mildly increased
preterm: 65-150 term: 20-170 >6 months: 15-45mg dL ⁻¹		

With a permission of Marjorie Lazoff, MD

was continuously febrile and had a stiff neck and also she had herpetic vesicular lesions involving the nose and mouth leading to a suspicion of viral herpetic encephalitis. It is not always possible to make the distinction between bacterial and viral meningitis and it is important for treatment decisions to attempt to distinguish between them (Table 1). Because of the brain edema, lumbar puncture has been delayed and since meningitis due to *Listeria monocytogenes* is not distinguishable clinically from other types of bacterial meningitis [15], empirical therapy administered as soon as possible without delay including ceftriaxone and acyclovir which might unlikely obscure the definitive diagnosis of bacterial from viral meningitis. Thus, polymerase chain reaction of CSF for the detection of HSV DNA and viral or bacterial culture of CSF were negative. In addition, there is no routine screening test for susceptibility to listeriosis during pregnancy.

The patient presented in pregnancy and history of consuming of unpasteurized milk, cheeses and deli-counter meats reported. The MR scan showed an involvement in subcortical areas including the medulla, pons and thalamus and it has been found that cerebellar dysfunction on EEG. In addition, the glucose concentration of CSF was found to be normal and the treatment with cephalosporin failed to resolve the patient. Finally the patient has given answer to the therapy with ampicillin. Therefore, she most likely has the diagnosis of listeriosis.

In conclusion, as was seen in our case, it is important for pregnant women working with animals not to touch these if possible or to wear gloves if this cannot be avoided. There is a chance that contamination may occur in uncooked meats, uncooked vegetables, unpasteurized milk, foods from unpasteurized milk and processed foods. Although the risk of listeriosis associated with foods from deli counters is relatively low, pregnant women whose immune systems are suppressed may choose to avoid these foods or to recook until they are hot before eating. The clinician must keep in mind listeriosis especially in pregnant women.

REFERENCES

1. North, R.A., R.S. Taylor and J.C. Schellenberg, 1999. Evaluation of a definition of pre-eclampsia. *Br. J. Obstet Gynaecol*, 106: 767-773.
2. DiMaio, H., 2000. *Listeria* infection in women, 7: 40-45.
3. Mylonakis, E., E.L. Hohmann and S.B. Calderwood, 1998. Central nervous system infection with *Listeria monocytogenes*. 33 years' experience at a general hospital and review of 776 episodes from the literature. *Medicine (Baltimore)*, 77: 313-336.
4. Farber, J.M. and J.Z. Losos, 1988. *Listeria monocytogenes*: A foodborne pathogen. *CMAJ*, 138: 413-418.

5. Tridente, V., U.M. Cataldi, B. Mossa, F. Morini, L. Bonessio, A. Ciardo and M. Salvi, 1998. A case of maternal and neonatal infection due to *Listeria monocytogenes*. Clin Ter., 149: 307-311.
6. Varma, J.K., M.C. Samuel, R. Marcus, R.M. Hoekstra, C. Medus, S. Segler, B.J. Anderson, T.F. Jones, B. Shiferaw, N. Haubert, M. Megginson, P.V. McCarthy, L. Graves, T.V. Gilder and F.J. Angulo, 2007. *Listeria monocytogenes* infection from foods prepared in a commercial establishment: a case-control study of potential sources of sporadic illness in the United States. Clin. Infect. Dis., 44: 521-528.
7. Listeriosis, 2000. Control of Communicable Diseases Manual. 17th Ed. Washington: American Public Health Association. Chin. J. ed., 296-299.
8. Fauci, A.S., E. Braunwald, K.J. Isselbacher *et al.*, 1998. In: Harrison's Principles of Internal Medicine McGraw-Hill, New York, pp: 899-901.
9. Lorber, B., 1997. Listeriosis. Clin Infect Dis., 24: 1-11.
10. Goulet, V. and P. Marchetti, 1996. Listeriosis in 225 non-pregnant patients in 1992: Clinical aspects and outcome in relation to predisposing conditions. Scand J. Infect. Dis., 28: 367-374.
11. Azimi, P.H., K. Koranyi, K.D. Lindsey, *Listeria monocytogenes*: Synergistic effects of ampicillin and gentamicin. Am. J. Clin. Pathol., 72: 974-977.
12. Mylonakis, E., M. Paliou, E.L. Hohmann, S.B. Calderwood and E.J. Wing, 2002. Listeriosis during pregnancy: A case series and review of 222 cases. Medicine (Baltimore). 81: 260-269.
13. Schuchat, A., 1997. Listeriosis and pregnancy: Food for thought. Obstet Gynecol Surv., 52: 721-722.
14. Mohamed, W., A. Darji, E. Domann, E. Chiancone and T. Chakraborty, 2006. The ferritin-like protein Fnm is a target for the humoral immune response to *Listeria monocytogenes* and is required for efficient bacterial survival. Mol. Genet Genomics, 275: 344-353.
15. Tonkic, M., D. Grgic, I. Goic-Barisic, A. Novak, I. Milas and N. Bradaric, 2006. A fatal case of *Listeria monocytogenes* sepsis and meningitis in a patient with Wegener's granulomatosis. Acta Med Croatica, 60: 501-503.